

5.10 BIOLOGICAL RESOURCES

5.10.1 Affected Environment

This section is divided into discussions of general vegetation, wildlife, and habitat types common to SBMR, SRAA, and WAAF, including sensitive species and habitats known to occur or with the potential to occur in this area. Also included are federal, state, and locally regulated species, such as threatened and endangered species or species of concern.

Included in this ROI is SBMR, SRAA, and WAAF and the proposed Helemanō Trail, with a 164-foot (50-meter) buffer on either side of the trail. The ROI was determined by analyzing the extent of potential impacts of routine military training activities and foot maneuvers. Since the potential effects of fire covered the largest area and included the areas affected by the introduction of weeds, noise, trampling, soil erosion, and all other impacts, the ROI was delineated using the fuel types, human-made barriers, and topographic barriers to fire. The Army and USFWS have yet to agree on the final SBCT ROI. Changes to the present ROI, depicted in Figure 5-32, could alter the qualitative and quantitative analyses within the biological resources affected environment section.

This EIS is being developed concurrently with consultation conducted in compliance with Section 7 of the ESA. The biological resource section will be updated as necessary to reflect any additional information or analysis that develops as part of Section 7 consultation. These updates will be included in the FEIS.

Recovery Plan

There are recovery plans for 34 plant and 1 animal species that are known to or have the potential to occur within the SBMR ROI. These species are listed in Appendix I-1a.

Installation Overview

The ROI contains areas of dry cliff, montane wet, lowland wet, and lowland moist communities (R. M. Towill Corp. 1997b; USARHAW and 25th ID [L] 2001a). The three types of montane wet communities in these training areas are mixed fern/shrub, 'ōhi'a forest, and 'ōhi'a shrubland. There is also a small lowland dry shrubland area.

Main Post

The Main Post is in central O'ahu and covers over 8,860 acres of land. It shares boundaries with the Kamehameha Highway to the east, private land and Mount Ka'ala Natural Area Reserve to the north, Wai'anae Kai Forest Reserve to the west, and Lualualei Naval Reservation and private and state-owned land to the south. Botanical surveys to identify rare plants, communities, and potential threats to these resources have been conducted intermittently since 1977. HINHP conducted a comprehensive biological survey from 1992 to 1993. The Center for Environmental Management of Military Lands (CEMML) conducted an additional comprehensive botanical survey in 1997. These reports provided the foundation for much of the botanical information currently in use to describe this area. South and east of the Main Post is the SRAA.

Figure 5-32

Schofield Barracks Military Reservation Biological Region of Influence

The vegetation on the Main Post includes residential and business and range areas that consist of highly managed nonnative vegetation like grasses, shrubs, and trees. The vegetation communities in the undeveloped border areas are mainly nonnative. Species include koa haole (*Leucaena leucocephala*), an invasive species of tree that regenerates rapidly after fire and is prone to forming dense thickets that exclude all other plants. Molasses grass (*Melinis multiflora*) also regenerates quickly after fire and can inhibit the growth of other plants by its dense matting and by producing chemicals that discourage other plants from taking root. Christmas berry (*Schinus terebenthifolius*) is an aggressive rapidly spreading tree whose dense canopy shades out understory plants and creates single species stands. This tree is most common in the mesic (moderately moist) forests and is not thought to be a threat to the wetter native communities.

South Range Acquisition Area

The SRAA is adjacent to Del Monte agricultural land and the Honouliuli Preserve, a 3,962-acre forest area managed by The Nature Conservancy since 1990. The preserve is habitat for over 70 rare species and contains five vegetation community types that are native to Hawai'i (HINHP 1994). The proposed acquisition land consists mainly of lowland dry shrubland and grassland and agricultural fields. The native natural communities and sensitive species are mostly restricted to the upper elevations of the Wai'anae Mountain range included in or adjacent to this proposed acquisition area.

A 0.3-acre dry cliff area is in the southwest portion of the SRAA, near the border of Honouliuli Preserve. The dominant vegetation in these communities is often 'ōhi'a (*Metrosideros polymorpha*) or lama, with understory shrubs like 'a'ali'i and 'akoko. Grasses can be native or introduced.

East Range

SBER is in central O'ahu, and shares boundaries with the town of Wahiawā to the northwest, Kamehameha Highway to the west, Kahana Valley to the east, KTA to the north, and private agricultural and forestland to the south. SBER contains native moist and wet forest types toward the Ko'olau Summit. These communities change to predominantly nonnative vegetation in the lower elevations. SBER covers 5,145 acres.

Wheeler Army Airfield

WAAF, an airfield with runways and ancillary facilities, is between the Main Post and SBER. It is a developed area that contains mainly nonnative urban vegetation.

Vegetation

The following vegetation communities described below occur in multiple places of the SBMR, WAAF, and SRAA ROI, as shown in Figure 5-33.

The mixed fern/shrub community is a fairly restricted community in the topmost reaches of the Ko'olau Mountains, and rainfall generally exceeds 150 inches (381 centimeters) (USARHAW and 25th ID [L] 2001a). Common fern species in the area include *Sadleria* spp.,

Figure 5-33

Vegetation Communities in the Schofield Barracks Military Reservation Biological Region of Influence

Cibotium spp., pala‘ā (*Odontosoria chinensis*), and *Diplazium* spp. Common shrub species include manono (*Hedyotis* spp.), ‘ōhi‘a, ‘ōhelo (*Vaccinium* spp.), and pū‘ahanui (*Broussaia arguta*). The only rare plant listed within this community at SBMR is O‘ahu violet (*Viola oahuensis*).

Montane wet ‘ōhi‘a forest is generally restricted to gulches and ridge tops between 3,200 and 4,000 feet (1,219 meters). The dominant tree is ‘ōhi‘a. Additional native species include manono (*Hedyotis terminalis*), mehame (*Antidesma platyphyllum*), ‘ōhi‘a hā (*Syzygium sandwicensis*) and kāwa‘u (*Llex anomala*). *Cibotium* species are the dominant ferns. Herbaceous plants are māmaki (*Pipturus albidus*), naupaka kuahiwi (*Scaevola* spp.), and na‘ena‘e (*Dubautia* spp.). Rare plants *Alsinidendron trinerve* and *Melicope christophersonii* complete the community.

‘Ōhi‘a shrubland falls between 2,500 and 3,000 feet (762 to 914 meters) in SBMR. The steep windswept ridges have shallow soil, and rainfall is generally between 100 and 200 inches (254 and 508 centimeters) per year. Dwarfed native tree and shrub species thrive here. In addition to ‘ōhi‘a, this community frequently consists of manono, ‘alani (*Melicope* spp.), and kōlea (*Myrsine* spp.). Common herbaceous species in this community include *Trematolobelia* spp. and *Clermontia* spp., and ferns are represented by *Cibotium* spp. and ‘ama‘u (*Sadleria* spp.). The documented rare plant of this vegetation community on the SBMR is O‘ahu violet (USARHAW and 25th ID [L] 2001a).

Within the lowland wet communities there are three community types, where conditions are generally warm and sheltered from wind, with annual rainfall exceeding 100 inches (254 centimeters). ‘Ōhi‘a forest is below the Ko‘olau summit between 1,900 and 2,700 feet (823 meters) and below 5,000 feet (1,524 meters) in the Wai‘anae Mountains (USARHAW and 25th ID [L] 2001a). In addition to the dominant tree ‘ōhi‘a, other common tree species include manono, mehame, and kōlea. *Cibotium* species are the dominant ferns. Herbaceous plants are māmaki, naupaka kuahiwi, and na‘ena‘e. Rare plants *Hesperomannia arborescens*, *Doodia lyonii*, *Pteris lidgatei*, *Tetraplasandra gymnocarpa*, *Cyrtandra subumbellata*, and *Isodendron laurifolium* complete the community in SBMR.

Uluhe shrubland is widespread on many of the Hawaiian Islands, usually in wet lowland areas below 2,200 feet (671 meters). The dominant plants in this community include two ferns, *Dicranopteris linearis* and *Diplopterygium pinnatum*. No rare plants were observed in this community.

Loulu hiwa forest gets between 75 and 150 inches (191 and 381 centimeters) of rainfall annually. It occurs exclusively in the Ko‘olau Mountains on steep, rocky windward slopes. The groves of loulu hiwa (*Pritchardia martii*) are generally homogenous, with little or no understory vegetation. This is considered a globally imperiled vegetation community (USARHAW and 25th ID [L] 2001a).

There are four types of lowland moist communities on the training areas:

- Kāwelu grassland has shallow soils and gets around 30 to 40 inches (76 to 102 centimeters) of rainfall annually. The kāwelu grasses *Eragrostis grandis* and *E. variabilis*, sedges (*Carex wahuensis* and *C. meyenii*), and dwarfed shrubs (*Bidens* spp., *Metrosideros*

polymorpha) make up the simple communities, along with rare plants nehe (*Lipochaeta tenuis*) and 'ānaunau (*Lepidium arbuscula*);

- 'Ōhi'a lowland moist shrubland is found on windy slopes commonly adjacent to the Kāwelu grassland, with similar plant species represented. The rare plants in this community are nehe, pāmakani (*Viola chamissoniana*), and pānaunau (*Lobelia yuccoides*);
- O'ahu diverse forest occupies only about an acre on SBMR. The soil is usually rocky and thin. Common natives are kōpiko (*Psychotria* spp.), mehame, 'āla'a (*Ponteria sandwicensis*), and pāpala (*Charpentaria* spp.). The only rare plant documented is *Pteralyxia macrocarpa*. This community is considered critically imperiled; and
- Koa/'Ōhi'a forest is below 2,100 feet (640 meters) and in leeward areas of good drainage, where the annual rainfall is between 35 and 75 inches (89 and 191 centimeters). In addition to the dominant trees 'ōhi'a and koa (*Acacia koa*), native trees in this community include kōpiko, mehame, 'ōhi'a hā, and 'ahakea (*Bohea* spp.). Uluhe (*Dicranopteris linearis*) is the dominant understory species, and rare plants in this community are nā'ū (*Gardenia mannii*), kāmakahala (*Labordia cyrtandrae*), *Schiedea pubescens* var. *purpurascens*, and pilo kea (*Platydesma cornuta* var. *decurrens*).

Lowland dry shrubland is generally dominated by 'a'ali'i and is found on the main islands of Hawai'i. Adjacent communities are often dominated by alien grasses and shrublands in fire-disturbed areas like SBMR.

The aquatic natural communities on SBMR are limited to intermittent streams. Though some of these may actually flow all year, agricultural ditches or flumes interrupt them all. The primary drainages for the Main Post are Waikōloa Gulch and Waikele Stream. The north fork and two tributaries (Hale'au'au and Mohiākea gulches) of Kaukonahua Stream flow along the northeast boundary of SBMR. All streams on SBMR empty into the Pacific Ocean, except for Waikele Stream, which flows into Pearl Harbor. There are possible marshy, forested, and riparian wetlands on or adjacent to SBMR (USARHAW and 25th ID [L] 2001a). The south fork of Kaukonahua Stream is the only drainage in SBER. The USGS collects streamflow data, but no fish data are available. A stream assessment was conducted for the whole Kaukonahua Stream that documented the endemic species 'o'opu nākea (*Awaous guamensis*), 'o'opu naniha (*Stenogobius hawaiiensis*), 'o'opu hi'ukole (*Lentipes concolor*), and 'o'opu 'ōkuhe (*Eleotris sandwicensis*) (USARHAW and 25th ID [L] 2001a), but natural resources staff have not confirmed these fish species on SBER.

Disturbed Habitat

The Army seeks to preserve and expand the populations of federally listed plants on lands under its management. The pest management and endangered species management programs overlap and reduce the negative impacts of introduced species on the landscape (USARHAW and 25th ID [L] 2001a). Control of noxious weeds is required by the State of Hawai'i Noxious Weed Rules (USDA, no date) and is supported by AR 200-5, the Army's pest management regulations (HQDA 1999).

Noxious weeds and other highly invasive plants targeted for control or eradication around rare plants and communities on SBMR include oriental vessel fern (*Angiopteris evecta*), satinleaf

(*Chrysophyllum oliviformes*), ginger (*Hedychium* spp.), and *Juniperus* spp. Current control efforts have focused on strawberry guava (*Psidium cattleianum*), ginger, and Koster's curse (*Clidemia hirta*) (USARHAW and 25th ID [L] 2001a). The alien plants that occur on SBER and that are targeted for control where they threaten rare or endangered species include moho (*Heliocarpus popayensis*), cat's claw (*Caesalpinia decapetala*), treedaisy (*Montana hibiscifolia*), false meadowbeauty (*Pterolepis glomerata*), Christmas berry, and Sacramento bur (*Triumfetta semitriloba*) (USARHAW and 25th ID [L] 2001a; PCSU 2001).

Populations of feral pigs (*Sus scrofa scrofa*) and goats (*Capra hircus hircus*) directly affect native plants and contribute to numerous ecological problems (Atlas 1998). The effects of these wild pigs and goats include trampled and grazed native plants, erosion, and landslides (USARHAW and 25th ID [L] 2001a; PCSU 1999, 2000, 2001). Water collects in the rutted ground, providing a perfect breeding place for mosquitoes, which can carry avian malaria (HINHP 1994). Browsing and otherwise destroying the native vegetation encourages alien plants to become established, which can severely affect the habitat.

The nonnative black twig borer (*Xylosandrus compactus*) is an additional threat to *Gardenia mannii*, *Alectryon macrococcus* var. *macrococcus*, *Flueggea neowawraea*, and possibly *Abutilon sandwicense*, *Melicope lidgatei*, and *Melicope st-johnii* (PCSU 1999). This pest burrows into branches and introduces a pathogenic fungus that often kills the host.

Introduced snails and slugs pose a threat to rare Hawaiian plants by preying on the seedlings' stems and fruit, which reduces regeneration of the host. Rats (*Rattus rattus* and *R. exulans hawaiiensis*) also are known to eat the fruit of native plants, seriously affecting the reproduction of *Pritchardia kaalae* and plants in the *Campanulaceae* and *Gesneriaceae* families (PCSU 2001).

Habitat disturbing activities by humans at SBMR include military training (R. M. Towill Corp. 1997b). Because most native and rare species grow on moderate to steep cliffs, ridges, and gulches, this disturbance is mostly limited to helicopter and foot traffic. Trampling associated with training activities (including construction and maintenance) could affect many of the rare plants (R. M. Towill Corp. 1997b). Pu'u Kalena and Pu'u Hāpapa hiking trails are within SBMR. Hiking activities are monitored to reduce potential human impacts. Littering, making campfires, committing arson, hunting, poaching, and using vehicles are nonmilitary activities that can affect the area (USARHAW and 25th ID [L] 2001a).

Fire occurs in SBMR and is a threat to native plants and ecological communities. Areas along the lower boundary of the native plant zones are mostly highly flammable introduced species. Additionally the rugged terrain of the training area limits access for fire suppression and control. As described in Section 2.1.5, the INRMP and ITAM LCTA programs at SBMR are used to minimize the impacts of training on vegetation through revegetation and fire suppression projects. A wildland fire management plan is being produced for SBMR and SBER and will focus on fire prevention and suppression; it will be finalized by August 2003.

Wildlife

Regular zoological field surveys have covered much of the SBCT ROI. These surveys have focused on special status invertebrates, mammals, and birds. There have been no specific reptile or amphibian surveys at SBMR, due to the absence of native terrestrial reptiles and amphibians on the Hawaiian Islands. Wildlife surveys were conducted by Shallenberger at SBMR in 1976 and 1977 (USARHAW and 25th ID[L] 2001a; Shallenberger and Vaughn 1978), by the HINHP (1994), and by Pacific Cooperative Studies Unit (PCSU) natural resources staff in 2000 and 2001. These natural resource surveys were used for the resource assessments in the *Endangered Species Management Plan Report, O'ahu Training Areas* (R. M. Towill Corp. 1997b), as well as the more recent *O'ahu Training Areas Natural Resource Management Report* (PCSU 2001) and the *O'ahu Training Areas INRMP* (USARHAW and 25th ID[L] 2001a).

Wildlife information for the SRAA has been gathered from the HINHP database (HINHP 2002) and the Honouliuli Preserve Master Plan (TNC 2000). Less information is available regarding WAAF and the proposed Helemanō Trail. WAAF is an established air field, which offers little refuge to wildlife, particularly native wildlife adapted to Hawai'i's natural habitats. The area proposed for the Helemanō Trail is presently used as agricultural fields and dirt roads. Common O'ahu wildlife would be expected to inhabit these areas. Wildlife information for these two locations was based on the *Draft Environmental Assessment for Realignment of Kunia Gate, Wheeler Army Airfield with the Existing Lyman Gate, Schofield Barracks* (Edward K. Noda and Associates, Inc. 2001), *Preliminary Draft EA Aviation Complex 6A & 6B, FY01-03, Whole Barracks Renewal Wheeler Army Airfield, O'ahu, Hawai'i*. (USACE 2001b), and *Preliminary Draft Schofield Barracks to Helemanō Military Vehicle Trail Land Acquisition Environmental Baseline Study* (USACE 2002b).

The following sections describe the general presence of invertebrate, mammal, bird, and fish species.

Invertebrates

The native invertebrates at the Main Post include the O'ahu tree snail (*Achatinella mustelina*), six achatinellid land snail species (*Acuriculella ambusta*, *A. spp. aff. castanea*, *A. spp. aff. perpusilla*, *Elasmuius spp.*, *Partulina dubia*, and *Tornatellides spp.*), and two amastrid land snail species (*Amastra rubens* and *Letachatina spp.*). Three other native snail species, *Cookeconcha spp.*, *Philonesia spp.*, and *Succinea spp.*, were also observed at the Main Post (R. M. Towill Corp. 1997b; USARHAW and 25th ID [L] 2001a). Endemic invertebrates at SBER include O'ahu tree snails (*Achatinella apexfulva*, *A. byronii*, *A. decipiens*, *A. leucorraphe*, *A. sowerbyana*, and *A. swiftii*). Also found at SBER are achatinellid land snails (*A. perpusilla*, *A. pulchra*, and *A. spp.*), the O'ahu megalagrion damselfly (*Megalagrion oahuensis*), the unique yellow-faced bee (*Hylaenus unica*), and 'ōpae 'oeha'a, the Hawaiian prawn (*Macrobrachium grandimanus*) (USARHAW and 25th ID [L] 2001a). Although the mountainous areas of the Honouliuli Preserve are valuable habitat to many O'ahu land snails, the portion proposed for the SRAA is highly disturbed agricultural area. These areas support mostly nonnative agricultural associated invertebrates (The Nature Conservancy 2000; HINHP 2002).

HHP surveys of SBMR in 1993 detected the following nonnative snails: giant African snail (*Achatina fulica*), bradybaenid land snail (*Bradybaena similaris*), cannibal snail (*Englandina rosea*), and the zonitid land snail (*Hawaiiia minuscula*). Humans have purposely or accidentally introduced these species to O‘ahu, and they now threaten the native snail species through competition for resources, predation, and the spread of disease.

Amphibians

There are no native terrestrial amphibians on the Hawaiian Islands. Nonnative amphibians found on O‘ahu include the green and black poison dart frog (*Dendrobates auratus*), the bullfrog (*Rana catesbeiana*), wrinkled frog (*R. rugosa*), giant toad (*Bufo marinus*), and Cuban tree frog (*Osteopilus septentrionalis*). These species were introduced into O‘ahu from other countries and have the potential to inhabit SBMR, WAAF, and the SRAA.

Reptiles

There are no native terrestrial reptiles on the Hawaiian Islands. Nonnative reptiles that have the potential to inhabit the SBMR, WAAF, and SRAA ROI include the green anole (*Anolis carolinensis*), mourning gecko (*Lepidodactylus lugubris*), stump-toed gecko (*Gehyra mutilata*), tree gecko (*Hemiphyllodactylus typus*), Indo-Pacific gecko (*Hemidactylus garnotii*), house gecko (*H. frenatus*), metallic skink (*Lampropholis delicata*), and gold dust day gecko (*Phelsuma laticauda laticauda*). The only known terrestrial snake occurring on the Hawaiian islands is the island blind snake (*Ramphotyphlops braminus*), although the brown tree snake (*Boiga irregularis*) has been found in Hawai‘i at airports and other ports of entry; attempts are being made to prevent this species from establishing itself on the Hawaiian Islands. The red-eared turtle (*Trachemys scripta elegans*) was recorded at Waikele Stream and may be found at SBMR. This species was also identified in Kaukonahua Stream (Ki‘iki‘i Stream), the primary drainage of Poahmoho tributary on KTA and may be found at SBER (USARHAW and 25th ID [L] 2001a).

Terrestrial Mammals

The Hawaiian hoary bat (*Lasiurus cinereus semotus*) may occur at all areas of SBMR and SRAA. The last known observation of the hoary bat at SBMR was in 1976 over the Schofield-Waikane Trail (PCSU 2001). It is the only native terrestrial mammal on the Hawaiian Islands (USFWS 1998a).

The following nonnative species may occur at SBMR and SRAA: feral pigs, feral goats, feral cats (*Felis catus*), feral dogs (*Canis familiaris familiaris*), Norway rats (*Rattus norvegicus*), black rats (*R. rattus*), Polynesian rats (*R. exulans hawaiiensis*), and the house mouse (*Mus musculus*).

Birds

The following indigenous species have been recorded at the Main Post: O‘ahu ‘elepaio (*Chasiempis sandwichensis ibidis*), O‘ahu creeper (*Paroreomyza maculatus*), ‘iwi (*Vestiaria coccinea*), ‘apapane (*Himatione sanguinea sanguinea*), O‘ahu ‘amakihi (*Hemignathus virens chloris*), white-tailed tropicbird (*Phaethon lepturus dorotbeae*), black-crowned night heron (*Nycticorax nycticorax boactli*), Pacific golden-plover (*Pluvialis fulva*), and the Hawaiian short-eared owl (*Asio flammeus sandwichensis*), also known as pueo. The O‘ahu ‘elepaio, O‘ahu creeper, ‘iwi, O‘ahu ‘amakihi, and ‘apapane are all species limited to the Hawaiian Islands. Native birds recorded at SBER

include the O‘ahu ‘elepaio, O‘ahu creeper, ‘i‘iwi, O‘ahu ‘amakihi, ‘apapane, and O‘ahu ‘ākepa (*Loxops coccineus wolstenholmi*), the white-tailed tropic bird, black-crowned night heron, and the Pacific golden-plover. Hawaiian short-eared owls are known to inhabit areas adjacent to the SRAA and may occur on the property (TNC 2000). Mostly nonnative and common birds such as the myna are expected to use the SRAA because of its highly disturbed nature and the agricultural habitat that it provides.

Nonnative bird species known to occur in SBMR include the red-billed leiothrix (*Leiothrix lutea*), white-rumped shama (*Copsychus malabaricus*), Japanese bush warbler (*Cettia diphone*), rock dove (*Columbia livia*), spotted dove (*Streptopelia chinensis*), zebra dove (*Geopelia striata*), common myna (*Acridotheres tristis*), red-vented bulbul (*Pycnonotus cafer*), and the Japanese white-eye (*Zosterops japonicus*). The nutmeg manikin (*Lonchura punctulata*), red-crested cardinal (*Paroaria coronata*), barn owl (*Tyto alba*), Erchel’s francolin (*Francolinus erckelii*), ring-necked pheasant (*Phasianus colchicus*), house sparrow (*Passer domesticus*), chestnut manikin (*Lonchura malacca*), and northern cardinal (*Cardinalis cardinalis*) are also species that have been introduced by humans on O‘ahu and are likely to occur on SBMR. Similar nonnative bird species are expected to occur in the SRAA.

Fish

The following endemic fish are known to inhabit the Waialeale Stream, which runs through the Main Post: ‘o‘opu nākea (*Awaous guamensis*), ‘o‘opu naniha (*Stenogobius hawaiiensis*), ‘o‘opu hi‘ukole, ‘o‘opu ‘ōkuhe (*Eleotris sandwichensis*), āholehole (*Kuhlia sandvicensis*), and ‘ama‘ama (*Mugil cephalus*) (USARHAW and 25th ID[L] 2001a). Although these species have not been confirmed on the Main Post, they may occur within that portion of the waterway. No fish data are available specific to Kaukonahua South Fork Stream on SBER (USARHAW and 25th ID[L] 2001a), but information was gathered for Kaukonahua (Kī‘iki‘i) Stream, which includes the Poamoho tributary on KTA and may represent some species at SBER. Native fish identified from the Kaukonahua Stream assessment include ‘o‘opu nākea, ‘o‘opu naniha, ‘o‘opu ‘ōkuhe, and ‘o‘opu hi‘ukole (USARHAW and 25th ID[L] 2001a). Nonnative species known to Waialeale Stream on SBMR include the mangrove goby (*Mugiligoius cavifrons*), liberty mollies (*Poecilia spehnops*), shortfin mollie (*P. mexicana*), bristle-nose (*Ancistrus* spp.), tilapias (*Tilapia melanotheron*, *Tilapia* spp.), Chinese catfish (*Clarias fuscus*), guppies (*Poecilia* spp., *P. reticulata*), loach (*Misgurnus anguillicaudatus*), mosquito fish (*Gambusia affinis*), *Thiaira tuberculata*, swordtail (*Xiphorus helleri*), *Lymnea reticulata*, and *Melanoides* spp. The following nonnative species may occur at SBER: swordtail, tilapia, snakehead (*Ophicephalus striatus*), stickfish (*Xenotodon cancila*), threadfin shad (*Dorosoma petenense*), midas cichlid (*Amphilophus citrinellum*/*Cichlasoma labiatum*), oscar, (*Astronotus ocellatus*), jewel cichlid (*Hemichromis elongatus*), bluegill (*Lepomis macrochirus*), *Carassius auratus*, *Ancistrus* spp., *Lophopodella carteri*, *Pterygoplichthys mlutiradiatus*, and bass (*Micropterus* spp.). The Wilson Lake overflow channel, which Helemanō Trail would cross, is perennial but it is not known if fish inhabit this human-made stream. There is no documented aquatic species information available for the SRAA.

Sensitive Species

Sensitive species include special status, or regulated, species such as federal or state listed endangered, threatened, candidate species, or proposed species, Marine Mammal Protection Act (MMPA) species, federal and state species of special concern, and locally regulated

species. Rare species that have had rapid population decline or whose habitat has markedly decreased in recent years are also considered sensitive species. Potential sensitive species at SBMR were identified by HDLNR (2002a), USARHAW biologists, and the HINHP (1994).

A current list of all sensitive plant and wildlife species and any critical habitat found in the SBMR ROI is provided in tables 5-23 and 5-24. The likelihood of a species occurring at SBMR is based on the habitat requirements and geographic distribution of the species, existing on-site habitat quality, and the results of biological surveys. Natural history descriptions of sensitive species with the potential to occur in the ROI, and specific locations if known, can be found in Appendix I-1 (Recovery Plans I-1a; Plants I-1b; Wildlife I-1c; Critical Habitat I-1d).

Sensitive Plant Species

The training areas that make up SBMR are home to 59 rare plant species. The USFWS has also proposed critical habitat for areas within SBMR. Documented occurrences of sensitive plant species in the ROI are shown in Figure 5-34 and Table 5-23.

Sensitive Wildlife Species

The following discussion includes only those special status wildlife species that are considered likely to be found in the project area. Twenty-eight special status wildlife species are known to occur or have the potential to occur at SBMR or its vicinity (R. M. Towill Corp. 1997b). These include twenty-two rare invertebrates (twenty of which are endangered mollusks), one damselfly and one wasp species, as well as five rare birds and an endangered bat (USARHAW and 25th ID [L] 2001a). Documented occurrences of sensitive wildlife species in the ROI are shown in Figure 5-35. Table 5-24 lists sensitive terrestrial wildlife species and their likelihood of occurrence in the SBMR ROI. Sensitive species occurring within the ROI are most likely to occur in the higher elevations of the Wai'anae and Ko'olau Mountains and are unlikely to occur in the disturbed lowland areas, which make up a large portion of the ROI. There is one wildlife species with a recovery plan in the ROI (Appendix I-1).

Sensitive Habitats

Critical Habitat

There are 5506 acres of federally designated and proposed critical habitat within the SBMR ROI: 4554 acres for 29 plants and 952 acres for O'ahu 'elepaio. Plants with proposed critical habitat within the ROI are listed in Appendix I-1d and are shown in Figure 5-36. Critical habitat for the O'ahu 'elepaio is shown in Figure 5-37.

Ecologically Sensitive Areas

Surveys done under The Nature Conservancy's HINHP show eleven native natural vegetation communities on SBMR. These zones are determined by climate, topography, elevation and prevailing ecological conditions. The HINHP considers two of these vegetation communities to be rare with a HINHP rank of G1: the O'ahu diverse lowland moist forest and Loulu Hiwa lowland wet forest (HINHP 1994).

Table 5-23
Sensitive Plant Species Occurring or Potentially Occurring in the SBMR/WAAF ROI

Scientific Name	Hawaiian Name/ Common Name	Federal ¹ Status	State ² /Global ³ Status	Habitat	Date Last Observed	Likelihood of Occurrence
<i>Abutilon sandwicense</i>	NCN	E, CH	-/G1	Dry to moist lowland forest	Unknown	U
<i>Alectryon macrococcus</i> var. <i>macrococcus</i>	‘ala ‘alahua, māhoe/-	E, CH	-/G2	Moist forest and gulch slopes in native dominated forest	2000	C
<i>Alsinidendron trinerve</i>	NCN	E, CH	-/G1	Wet forest slopes	2000	P
<i>Bohea sandwicensis</i>	‘ahakea/-	-	-/G1	Moist to wet forests	2002	C
<i>Chamaesyce rockii</i>	‘akoko, koko, kōkōmālei/-	E, CH	-/G1	Wet ‘ōhi‘a-uluhe forests on upper ridges	1993	C
<i>Cyanea acuminata</i>	Hāhā/-	E, CH	-/G1	Moist to wet forests	2001	C
<i>C. calcunia</i>	Hāhā/-	C	/	Moist to wet forests	2001	C
<i>C. grimesiana</i> spp. <i>obate</i>	Hāhā/-	E, CH	-/G2	Moist to wet forests	1992	C
<i>C. koolauensis</i>	Hāhā/-	E, CH	-/G1	Moist to wet forest	2000	C
<i>Cyrtandra subumbellata</i>	Ha‘iwale/-	E, CH	-/-	Moist to wet forests	2000	C
<i>C. viridiflora</i>	Ha‘iwale/-	E	/	Moist to wet forests	2001	C
<i>Delissea subcordata</i>	NCN	E, CH	-/G1	Moist forest	2000	C
<i>Diellia falcata</i>	Palapalai lau li‘i/-	E, CH	-/G1	Dry forests in deep shade or open understory	2000	C
<i>Dissochondrus biflorus</i>	-/NCN	SOC	-/G2	Diverse moist forest slopes	1994	P
<i>Dubautia sherffiana</i>	Na‘ena‘e/-	SOC	-/G1	Dry coastal and wetter inland ridge tops	2000	P
<i>Exocarpos gaudichaudii</i>	Heau/whisk broom sandalwood	SOC	-/G1	Moist ridges and shrubland, often associated with ‘ōhi‘a	2000	P
<i>Flueggea neowawraea</i>	Mehamehame/-	E, CH	-/-	Moist forests and gulch slopes	2000	C
<i>Gardenia mannii</i>	Nānū, nā‘ū/-	E, CH	-/G1	Moist to wet forests dominated by ‘ōhi‘a	1992	C
<i>Hesperomannia arborescens</i>	NCN	E, CH	-/-	Slopes and ridges in wet forest	2000	P
<i>Isodendron longifolium</i>	aupaka/-	T, CH	-/-	Diverse moist forest on rocky slopes	2000	C
<i>Labordia cyrtandrae</i>	kāmakahala/-	E, CH	-/G1	Moist valleys and forests	2000	C
<i>L. kaalae</i>	kāmakahala/-	SOC	-/G1	On ridges in diverse moist forest	2001	P
<i>Lepidium arbuscula</i>	‘ānaunau, naunau, kūnānā/-	E, CH	-/G1	Commonly found on exposed ridges and cliffs	2000	C
<i>Lipochaeta lobata</i> var. <i>leptophylla</i>	nehe/-	E, CH	-/G2	Common in dry coastal habitats	2000	C
<i>L. tenuis</i>	nehe/-	SOC	-/G2	Found only in the central Wai‘anae Mountains in diverse moist forest	2001	P
<i>Lobelia gaudichaudii</i> var. <i>koolauensis</i>	NCN	E	-/-	Wet cloud-swept slopes	2000	C
<i>L. niuhauensis</i>	pānaunau/-	E, CH	-/G2	Wet windswept summits	2001	C
<i>L. oahuensis</i>	pānaunau/-	E, CH	-/G2	Wet windswept summits	2001	C
<i>L. hypoleuca</i>	pānaunau/-	-	-/G3	Dry ridges and canyons in diverse moist forest	2001	C

Table 5-23
Sensitive Plant Species Occurring or Potentially Occurring at SBMR/WAAF ROI *(continued)*

Scientific Name	Hawaiian Name/ Common Name	Federal ¹ Status	State ² /Global ³ Status	Habitat	Date last Observed	Likelihood of Occurrence
<i>Melicope cinera</i>	‘alani/-	SOC	-/G1	Native dominated moist forests	2000	P
<i>Nerandia angulata</i> var. <i>angulata</i>	ma‘aloa/-	E, CH	-/G1	Diverse moist forests	2000	C
<i>Nerandia melastomatifolia</i>	ma‘aloa/-	SOC	-/G2	Diverse moist forests	2000	C
<i>Nothocestrum latifolium</i>	Kulu‘i/-	SOC	-/G2	Dry ridges and canyons in diverse moist forest	2002	C
<i>Panicum beechyi</i>	NCN	-	-/G2	Mesic ridges and gulch bottoms	2002	C
<i>Pblegmariarus nutans</i> (<i>Lycopodium nutans</i>)	wāwae‘iole/-	E, CH	-/-	Wet forest	2000	C
<i>Phyllostegia hirsuta</i>	ulihi/-	E, CH	-/G1	Steep shaded slopes in wet to moist forests	2001	C
<i>P. kaalaensis</i>	ulihi/-	E	-/G1	Steep shaded slopes in wet to moist forests	2001	C
<i>P. mollis</i>	ulihi/-	E, CH	-/G1	Steep shaded slopes in wet to moist forests	2000	C
<i>Plantage princeps</i> var. <i>princeps</i>	‘ale, laukahi kuahiwi/-	E, CH	-/-	Moist cliffs and rainforests	2000	C
<i>Platydesma cornuta</i> var. <i>cornuta</i>	pilo kea/-	C	-/G2	Moist forest	2000	C
<i>Pleomele forbesii</i>	halapepe/-	C	-/G1	Dry and moist forests	2000	C
<i>Pritchardia kaalae</i>	loulu/-	E	-/G1	Moist to dry cliff zones	2000	C
<i>Pteralyxia macrocarpa</i>	kaulu/-	C	-/G2	Valleys and slopes of diverse moist forest	2000	C
<i>Pteris lidgatei</i>	waikamanui/-	E, CH	-/G1	Lowland wet forests	2000	C
<i>Sanicula purpurea</i>	NCN	E, CH	-/G1	Moist forests in deep soil	2001	C
<i>Schiedea hookeri</i>	mā‘oli‘oli/-	E, CH	-/G1	Diverse moist forest	2000	C
<i>S. lunguistrina</i>	mā‘oli‘oli/-	SOC	-/G2	Diverse moist forest	1992	C
<i>S. nuttallii</i>	mā‘oli‘oli/-	E, CH	-/G1	Diverse moist forest	2000	C
<i>Sicyos lanceoloidea</i>	‘anunu/-	SOC	-/G1	On ridges or spurs in moist forest	2000	C
<i>Strongylodon ruber</i>	NCN	SOC	-/G1	Mid-elevation wet forest	2001	C
<i>Tetraplasandra gymnocarpa</i>	‘ohe‘ohe/-	E, CH	-/G1	Wet to moist summit forests	2000	C
<i>Viola chamissoniana</i> spp. <i>chamissoniana</i>	‘olopū, Pāmakani/-	E, CH	-/G3	Moist, somewhat exposed cliff habitat	2000	C
<i>V. oahuensis</i>	NCN	E, CH	-/-	Wet forests on cloud-swept summits	2001	C
<i>Zanthoxylum oahuense</i>	NCN	C	-/G2	Moist to wet forests	2001	C

Sources: USFWS 2002a; USARHAW and 25th ID [L] 2001a; PCSU 2001

Notes:

NCN = No common name

Status:

¹Federal:

E = Endangered occurrences)

SOC = Species of concern

C = Candidate species for listing

CH = Critical habitat designated or proposed for designation

²State

/-/- = No Status

³Heritage Global Rank:

G1 = Species critically imperiled globally (typically 1-5 current

G2 = Species imperiled globally (typically 6-10 current occurrences)

G3 = Species very rare with restricted range

Likelihood of occurrence on the project site

C = Confirmed

P = Potentially may occur

U = Unlikely to occur

Figure 5-34

Special Status Plant Species in the Schofield Barracks Military Reservation Biological Region of Influence

Table 5-24
Sensitive Terrestrial Wildlife Species Occurring or Potentially Occurring in the SBMR/WAAF ROI

Scientific Name	Hawaiian Name/Common Name	Federal ¹ Status	State ² /Global ³ Status	Habitat	Date last Observed	Likelihood of Occurrence
Invertebrates						
<i>Achatinella apexfulva</i>	pūpū kuahiwi, pūpū kani'oe, kāhuli/O'ahu tree snail	E	E/G1	Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 m)	1953	P
<i>A. byronii/ decipiens</i>	pūpū kuahiwi, pūpū kani'oe, kāhuli/O'ahu tree snail	E	E/G1	Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 m)	2000	C
<i>A. leucoraphe</i>	pūpū kuahiwi, pūpū kani'oe, kāhuli/O'ahu tree snail	E	E/G1	Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 m)	1989	C
<i>A. lila</i>	pūpū kuahiwi, pūpū kani'oe, kāhuli/O'ahu tree snail	E	E/G1	Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 m)	-	P
<i>A. mustelina</i>	pūpū kuahiwi, pūpū kani'oe, kāhuli/O'ahu tree snail	E	E/G1	Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 m)	2000	C
<i>A. sowerbyana</i>	pūpū kuahiwi, pūpū kani'oe, kāhuli/O'ahu tree snail	E	E/G1	Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 m)	2000	C
<i>A. swiftii</i>	pūpū kuahiwi, pūpū kani'oe, kāhuli/O'ahu tree snail	E	E/G1	Native Hawaiian shrublands, forests, and bogs above 1,000 feet (305 m)	1970's	P
<i>Amastira cylindrica</i>	-/Amastrid land snail	SOC	-/G1	Areas with native vegetation, specific preferences not available	1966	P
<i>A. micans</i>	-/Amastrid land snail	SOC	-/G1	Areas with native vegetation, specific preferences not available	2001	C
<i>A. spirizona</i>	-/Amastrid land snail	SOC	-/G1	Areas with native vegetation, specific preferences not available	1965	P
<i>Anriculella ambusta</i>	-/Achatinellid land snail	-	-/G1	Areas dominated with native vegetation	1986	C
<i>A. sp. aff. castanea</i>	-/Achatinellid land snail	-	-/G1	Areas dominated with native vegetation	1988	C
<i>A. sp. aff. perpusilla</i>	-/Achatinellid land snail	-	-/G1	Areas dominated with native vegetation	1966	P
<i>Cookeconcha</i> spp.	-/Endodontid land snail	SOC	-/G1	Areas with native vegetation; specific preferences not available	-	P
<i>Hylaenus unica</i>	-/unique yellow-faced bee	SOC	-/-	Subalpine forest	-	P
<i>Laminella sanguinea</i>	-/Amastrid land snail	SOC	-/G1	Areas with native vegetation, specific preferences not available	2000	C
<i>Leptachatina</i> sp.	-/Amastrid land snail	SOC	-/G1	Areas with native vegetation; specific preferences not available	-	P
<i>Lepachatina</i> sp. (O'ahu)	-/Amastrid land snail	SOC	-/G1	Areas with native vegetation, specific preferences not available	1965	P

Table 5-24 (continued)
Sensitive Terrestrial Wildlife Species Occurring or Potentially Occurring in the SBMR/WAAF ROI

Scientific Name	Hawaiian Name/Common Name	Federal ¹ Status	State ² /Global ³ Status	Habitat	Date last Observed	Likelihood of Occurrence
<i>Megalagrion oahuensis</i>	-/O'ahu megalagrion damselfly	SOC	-/G1	Breed in damp leaf litter	1958	P
<i>Partulina dubia</i>	-/Achatinellid land snail	SOC	-/G1	Areas dominated with native vegetation	1948	P
<i>Pleuropoma sandwichiensis</i>	-/Helicinid land snail	SOC	-/G1	Areas with native vegetation; specific preferences not available)	1966	P
Birds						
<i>Asio flammeus sandwichiensis</i>	pueo/Hawaiian short-eared owl	SOC+	E*/G5T3	Pastures, grasslands, dry and wet forests that are dominated by either native or nonnative vegetation. Sea level to 7,900 feet (2,408 m).	1986	C
<i>Chasiempis sandwichiensis ibidis</i>	O'ahu 'elepaio/-	E, CH	E/G4T1	Native Hawaiian forest	2000	C
<i>Loxops coccineus wolstenholmi</i>	O'ahu 'ākepa/-	-	-/G2	Montane 'ōhi'a-koa forest above the 3,000 foot (914.4 m) level	1976	P
<i>Paroreomyza maculata</i>	'alauahio/O'ahu creeper	E	E /G1	Native Hawaiian shrublands, forests, and bogs	1976	P
<i>Vestiaria coccinea</i>	'iwi/Hawaiian honeycreeper	+	E*/G4	Native forests, especially 'ōhi'a (<i>Metrosideros</i>) forest	1998	C
Mammals						
<i>Lasiurus cinereus semotus</i>	-/Hawaiian hoary bat	E	E /G5T2	Bare rock, cliff, hardwood forest, grassland/herbaceous, hardwood woodland, and riparian habitats.	1988	C

Sources: USARHAW and 25th ID [L] 2001a; HDLNR 2002a; HINHP 1994; R. M. Towill Corp. 1997b; PCSU 2001; NatureServe 2001; Virginia Tech 1998

Notes:

NCN = No common name

*The state endangered listing refers only to the populations on O'ahu, Lanai, and Moloka'i.

- Not yet recored within the SBMR/WAAF ROI

Status:

¹Federal:

E = Endangered
 SOC = Species of concern
 C = Candidate species for listing
 CH = Critical habitat designated or proposed for designation
 + = Birds of Conservation Concern

²State

E = Listed as endangered
 -/= No Status

³Heritage Global Rank:

G1 = Species critically imperiled globally (typically 1-5 current occurrences)
 G2 = Species imperiled globally (typically 6-10 current occurrences)
 G4 = Species apparently globally secure
 G5 = Species demonstrably globally secure
 T1 = Subspecies critically imperiled globally (typically 1-5 current occurrences)
 T2 = Subspecies imperiled globally (typically 6-10 occurrences)
 T3 = Subspecies either very rare and local throughout its range or found locally (even abundantly at some of its locations) in a restricted range, or because of other factors making it vulnerable to extinction throughout its range (21-100 occurrences).
 T4 = Subspecies apparently globally secure

Likelihood of occurrence on the project site

C = Confirmed
 P = Potentially may occur
 U = Unlikely to occur

Figure 5-35

Special Status Wildlife Species Occurring in the Schofield Barracks Military Reservation Biological Region of Influence

Figure 5-36

Proposed Critical Plant Habitat in the Schofield Barracks Military Reservation Biological Region of Influence

Figure 5-37

Federally Designated Critical Habitat for the O'ahu 'Elepaio at the Schofield Barracks Military Reservation
Biological Region of Influence

Three ecological zones have been identified in the SBMR survey area. The wet summit crest zone exists in areas above 3,000 feet (914 meters), along the tops of the Wai'anae and Ko'olau Mountains. This zone contains the globally imperiled Loulu Hiwa lowland wet forest. Cliffs and moderate slopes are the topographically dominant features in this cool, wet cloud-swept region.

Below this is the moist ridges and cliffs zone, which is warmer and drier than the wet summit zone, though it does not escape the winds. The vegetation community on this part of SBMR supports 'ōhi'a lowland moist shrubland and Kāwelu lowland moist grassland; these communities are not considered rare and have a Global Heritage Ranking of G3.

The third ecological zone exists below the steepest cliffs and slopes described above and along the ridge tops to the gulch bottoms; this is the lowland forest zone. Typically warm and moist to wet, there are three forest types in this zone. The koa/'ōhi'a lowland moist forest is predominant on ridge tops and in lower elevations; 'ōhi'a lowland wet forests and uluhe lowland wet shrubland are the dominant native natural communities. O'ahu diverse lowland moist forests occur on north-facing, moderately steep slopes, are considered rare, and have a Global Heritage ranking of G1.

Biologically Significant Areas (BSAs)

SBMR contains large expanses of native-dominated plant communities. These areas are defined to prioritize areas for management based on their relative richness of rare natural resources. The Hawai'i Natural Heritage Program has defined three types of biologically significant areas for managing the important natural communities (Figure 5-38). They are described below.

BSA1 contains a high density of federally listed endangered, proposed endangered, or candidate species. There are three noncontiguous areas in the Wai'anae area of SBMR that have the BSA1 designation, and all three areas are habitat for the endangered land snail *Achatinella mustelina* and several endangered plants. The southernmost BSA1 is near Pu'u Hāpapa and the Honouliuli Preserve. It is the habitat for over 20 native and protected plant species, in addition to the endangered snail. This area is in the zone of proposed acquisition for the Army firing range (QTR2) at SBMR. The Ko'olau Mountain area of SBMR has two areas defined as BSA1. These areas are both in the eastern portion of the range, near the summit crest, and contain several species of endangered plants.

BSA2 contains all or some of the following: lower densities of federally listed endangered or proposed endangered species; candidate species or other species of concern that are expected to be upgraded to federal protected status within the next few years; and areas judged likely to contain high densities of federally listed species, based on habitat assessment, despite the lack of any record of such occurrence to date. SBMR has two noncontiguous areas and one somewhat isolated area of habitat classified as BSA2. These regions contain typical vegetation for natural communities of moist ridges and cliffs and lowland forest zones. There is one BSA2 in the Ko'olau region of SBMR at East Range. It covers most of the eastern end of the range and is primarily a lowland forest. Most of the rare plants found in the Ko'olau range survey are in this area.

BSA3 contains stands of intact native vegetation with few or no known occurrences of rare elements. There is one BSA3 in the Waiʻanae region of SBMR. There are no findings that support knowledge of natural communities in the area. Although there are no rare communities in the BSA3 area, the forest includes six native endangered plant species (*Cyanea grimseana*, *Gardenia mannii*, *Labordia cyrtandrae*, *Lycopodium nutans*, *Pteris lidgatei*, and *Tetraplasandra gymnocarpa*). The BSA3 designated range in the East Range/Koʻolau region contains *Gardenia mannii* and *Cyanea longiflora* but no rare natural communities. It is likely that with further surveys of the areas additional rare plant occurrences would be documented.

Also found within the ROI is sensitive snail habitat. Although this habitat has not been federally designated or proposed as critical habitat it has been identified as containing the habitat requirements necessary for supporting the federally listed and snail species of concern on Oʻahu. This area is shown in Figure 5-38.

5.10.2 Environmental Consequences

The Army and USFWS have not yet agreed on a final SBCT ROI for biological resources. Changes to the present ROI, depicted in Figure 5-32, could alter the qualitative and quantitative analyses within this environmental consequences section.

Summary of Impacts

Biological resources that have been considered include vegetation communities, wildlife, sensitive species, and sensitive habitats. All biological resources have been assessed for potential impacts from project activities. (For a full description of the impact methodology used to determine impact to a resource, please refer to chapter 4.10. Only the resources potentially affected are included in this chapter; if a resource was determined not to be affected, it was not included for discussion.) A summary of impacts is provided in Table 5-25. Significant impacts mitigable to less than significant would occur on sensitive plants and habitat from wildfires sparked by military training activities, on federally listed species and habitat from training activities, and on sensitive plants from the spread of nonnative species introduced by construction and troop movements. Another significant but mitigable impact would be the loss or degradation of sensitive species or habitat from facility construction or training activities. Less than significant impacts would occur relating to threats to migratory birds from the construction of FTI antennas, noise and visual effects on wildlife from construction and training activities, and on general vegetation and wildlife from training activities and facility construction and operation.

Proposed Action

Significant Impacts Mitigable to Less than Significant

Impact 1: Impacts from fire on sensitive species and habitat. Military training activities would increase the probability of wildfires and would increase the likely intensity of fires that occur. Wildfires that burn into native communities or sensitive habitats would destroy listed plant and animal species and sensitive habitats.

Figure 5-38

Biologically Sensitive Areas found in the Schofield Barracks Military Reservation Biological Region of Influence

Table 5-25
Summary of Potential Biological Impacts at SBMR/WAAF

Impact Issues	Proposed Action	Reduced Land Acquisition		No Action
Impacts from fire on sensitive species and habitat.	⊗*	⊗*		⊗
Impacts on federally listed species and their federally designated or proposed critical habitat.	⊗*	⊗*		⊗
Impact on sensitive species resulting from the spread of nonnative species.	⊗	⊗		⊗
Loss and degradation of sensitive species and habitat.	⊗	⊗		⊗
TSV vessel impacts on marine wildlife and habitat.	N/A	N/A		N/A
Threat to migratory birds.	⊙	⊙		⊙
Noise and visual impacts.	⊙	⊙		⊙
Impacts on general vegetation and wildlife.	⊙	⊙		⊙
Runoff impacts on marine wildlife and coral ecosystems.	N/A	N/A		N/A

In cases when there would be both beneficial and adverse impacts, both are shown on this table. Mitigation measures would only apply to adverse impacts.

* Impacts may be mitigable to less than significant.

LEGEND:

⊗ = Significant	+	= Beneficial impact
⊗ = Significant but mitigable to less than significant	N/A	= Not applicable
⊙ = Less than significant		
○ = No impact		

The use of ammunition, weapon systems, and pyrotechnics during military training increases the risk of wildland fire ignition. Because natural sources of fire ignition are relatively rare in Hawai'i, many Native Hawaiian plants are not adapted to fire and are adversely affected by it. Alien species, particularly alien grasses and shrubs, typically invade areas after they have burned. This inhibits the regeneration of native plants. The removal of native species and the spread of alien species are potentially significant adverse impacts associated with wildland fires.

Wildfires at SBMR are commonly caused by tracer fire and generally start in the impact area. Fire breaks surrounding the impact area generally prevent wildland fires from escaping to undisturbed areas; however, fires do occasionally escape and are also occasionally started in other areas by other sources, such as cigarettes, vehicles, and other military activities. Wildland fires could spread and adversely affect biological resources throughout the ROI.

Tracer rounds would be used at ranges within the Main Post but not within SBER or the SRAA, so the threat of fire there would be significantly lower than at the Main Post. The ranges at SBMR are designed so that all ammunition firing occurs within firebreak roads. Firing and mortar points are located to ensure that the maximum range of the weapon would not overshoot the impact area. For small arms ranges where tracer rounds are used, the ranges are laid out so that tracer burnout occurs before a round leaves the impact area. It is unlikely that wildfires would be ignited in areas not used for training because these areas are typically dominated by less flammable vegetation (this determination was developed during Section 7 consultation).

The UAV would be used over much of the land area at SBMR but is not expected to affect biological resources during normal operation. However, due to the nature of the UAV, accidents would be possible and could cause wildfires.

In addition to vegetation loss, major adverse ecological effects of wildland fires include reduced watershed stability, soil erosion, increased risk of weed invasion, and loss of native habitat. Fires could destroy native plants and slow-moving animals, such as snails, and could displace mobile animals. BSAs within the ROI that could be affected by a wildfire are presented in Table 5-26. In addition, the following sensitive habitats are within the SBMR ROI: BSAs, federally designated critical habitat for O‘ahu ‘elepaio, and habitat used by numerous species of native Hawaiian land and tree snails. There is no assurance that fires or other threats associated with the Proposed Action would not reach or otherwise threaten populations of listed species within the SBMR ROI.

Table 5-26
BSAs within the ROI

Biologically Significant Areas	Main Post ROI (acres)	SRAA ROI* (acres)	SBER ROI (acres)
BSA-1	51	Not applicable	50.5
BSA-2	478.6	Not applicable	247.7
BSA-3	30.1	Not applicable	1,211.7

Source: R.M.Towill Corp 1997b.

*SRAA does not contain any BSAs

The sensitive plants at some risk from SBCIT fire-related threats are māhoe, hāhā (*Cyanea grimseana obate*), *Delissea subcordata*, *Diellia falcata*, mehamehame (*Flueggea neowawraea*), *Hesperomannia arborescens*, aupaka (*Isodendron longifolium*), *Labordia cyrtandrae*, ‘ānaunau, *Lobelia niihauensis*, *Phyllostegia mollis*, *P. kaalaensis*, ale, *Schiedea bookeri*, and ‘olopū (this determination was made during Section 7 Consultation).

The following sensitive wildlife are known to occur or are likely to occur in the ROI and are likely to be affected by the outbreak of a wildfire as the result of the Proposed Action: O‘ahu ‘elepaio, ‘iwi, *Achatinella mustelina*, and the Hawaiian hoary bat. These species have been identified as occurring within areas of low to moderate fire risk and would be directly or indirectly affected through the loss of habitat disturbed by a fire outbreak. Impacts on these federally listed species may be mitigable to less than significant.

Regulatory and Administrative Mitigation 1. The following USARHAW standards and measures previously agreed to with USFWS would minimize the impact of fire on sensitive species and habitats:

- Implementation of the WFMP, which upon its completion in August 2003, will detail fire avoidance systems and response strategy. General fire protection measures are described in the wildfire section within Section 5.12.2, Hazards.
- The ecosystem management directives and Army stewardship, described in Section 2.2.4, would avoid and minimize fire impacts on sensitive species by protecting and restoring sensitive species and habitat.
- USARHAW is considering implementing an environmental management system to further improve the identification and reduction of environmental risks inherent in mission activities. This would include ecosystem level management for all rare species, pest management, land rehabilitation and maintenance, and fire prevention and suppression.
- Section 7 consultation and regulatory and administrative mitigations 2, 3, and 4 would apply to this impact and would help reduce the impact to a less than significant level.
- USARHAW would notify the USFWS if a fire were to escape the firebreak roads within the ROI and would consult as necessary.

Additional Mitigation 1. Potential mitigation measures for this impact include:

- Providing resources to help adjacent private landowners and organizations manage their properties to minimize potential impacts of fire or other threats that may result from USARHAW activities or that may originate on private property and affect USARHAW activities.
- Replanting any area that is damaged by fires with plants similar to those destroyed by fire. Native species would be used in areas where their establishment seems likely. Plants known to be invasive or noxious would not be used.
- Additional Mitigation 2, 3, and 4 would apply to this impact and would help reduce the impact to a less than significant level.

Impact 2: Impacts on federally listed species and their federally designated or proposed critical habitat. There would be long-term significant and mitigable impacts on listed species and their designated or proposed critical habitat as a result of SBCT training activities. Listed species affected by the project action include the following:

- Plants: *Abutilon sandwicense*, *Alectryon macrococcus* var. *macrococcus*, *Alsinidendron trinerve*, *Chamaesyce rockii*, *Cyanea acuminata*, *C. grimesiana* spp. *grimesiana*, *C. koalaensis*, *Cyrtandra subumbellata*, *C. viridiflora*, *Delissea subcordata*, *Diellia falcata*, *Flueggea neowawraea*, *Gardenia mannii*, *Hesperomannia arborescens*, *Isodendron longifolium*, *Labordia cyrtandrae*, *L. kaalae*, *Lepidium arbuscula*, *Lipochaeta lobata* var. *leptophylla*, *L. tenuis*, *Lobelia gaudichaudii* var.

koolauensis, *L. niibauensis*, *L. hypoleuca*, *Phlegmariurus nutans* (*Lycopodium nutans*), *Phyllostegia hirsuta*, *P. mollis*, *P. kaalensis*, *Plantago princeps* var. *princeps*, *Platydesma cornuta* var. *decurrens*, *P. cornuta* var. *cornuta*, *Pleomele forbesii*, *Pritchardia kaalae*, *Pteralyxia macrocarpa*, *Pteris lidgatei*, *Sanicula purpurea*, *Schiedea bookeri*, *S. nuttallii*, *Solanum sandwicense*, *Strongylodon ruber*, *Tetramolopium lepidotum* spp. *lepidotum*, *Tetraplasandra gymnocarpa*, *Urera kaalae*, *Viola chamissoniana* spp. *chamissoniana*, *V. oahuensis*; and

- Wildlife: *Achatinella apexfulva*, *A. byronii*, *A. decipiens*, *A. leucoraphe*, *A. lila*, *A. mustelina*, *A. sowerbyana*, *A. swiftii*, *Paroreomyza maculata*, *Lasiurus cinereus semotus*, *Chasiempis sandwichensis ibidis*, and the O‘ahu ‘elepaio.

The proposed locations of restricted road mounted maneuvers and dismounted training is the same area where listed species have been known to occur (Figures 5-34 and 5-35). It is also near the O‘ahu ‘elepaio’s federally designated critical habitat, as well as the proposed critical habitat of 99 plant species (Figures 5-37 and 5-38). There are 952 acres of O‘ahu ‘elepaio critical habitat within the SBMR ROI, and twenty ‘elepaio have been identified within the SBMR ROI (HINHP 2002; see Figure 5-35). There are also 4554 acres of proposed plant critical habitat within the ROI. No impacts from construction activities are expected to occur to listed species and their critical habitat since there would be no construction activities occurring in the vicinity of the designated or proposed critical habitat.

The proposed training includes road mounted maneuvers (though there would be no off-road mounted maneuvers within or in the vicinity of federally designated or proposed critical habitat) and dismounted maneuvers. There would be an additional 810 soldiers training as part of SBCT Transformation. There would also be an increase in the intensity of the training, with more ammunition being used in the ROI. This would result in direct and indirect impacts to listed species and their designated or proposed critical habitat by causing the take of federally listed species and the degradation of critical habitat. Listed snail species could be crushed by mounted and dismounted maneuvers. More vegetation would be trampled, both in new areas and to a greater extent. Erosion, noise, and the visual presence of humans and large machinery would increase. Long-term impacts on listed species and critical habitat include the potential for increased nonnative and invasive nonnative species due to habitat disturbance or people bringing these species to the area on their clothing or cars, and the increased probability of fire (discussed further under Impact 3). Nonnative species threaten the viability of the ‘elepaio and its federally designated critical habitat by carrying diseases, outcompeting it, preying on it, and altering its habitat.

These impacts would combine to deter the listed species’ use of lands surrounding the ROI. Impacts on these federally listed species may be mitigable to less than significant.

Regulatory and Administrative Mitigation 2. The effects of SBCT actions on listed species and federally designated critical habitat occurring in the ROI are being evaluated as part of Section 7 consultation with USFWS. The USARHAW would consult about the proposed plant-critical habitat when it receives its federal designation. All reasonable and prudent measures determined during this consultation would be incorporated into the proposed

action. These measures would help avoid effects and compensate for impacts on listed species that would result directly and indirectly from implementation of the proposed action.

Ongoing programs that would lessen the impact on listed species and their designated or proposed critical habitat include the ecosystem management plan, endangered species management plan, and INRMP (USARHAW and 25th ID[L] 2001a; R. M. Towill Corp. 1997b). Land acquired as part of the SRAA would be incorporated into the ITAM and ecosystem management plan to protect any sensitive resources on or around this area. This would minimize soil erosion and loss to natural habitats that would otherwise occur as the result of mounted and dismounted maneuvers.

Additional Mitigation 2. No additional mitigations have been proposed.

Impact 3: Impacts on sensitive species resulting from the spread of nonnative species. In general, nonnative plant and animal species pose a threat to Native Hawaiian ecosystems. The proposed actions at SBMR would be expected to affect the introduction and spread of alien species in the following ways:

- Movement of troops and equipment into Hawai'i from continental US or foreign ports, as well as from other islands or subinstallations within Hawai'i would increase the likelihood of alien plant introductions;
- Construction can introduce alien species and other weeds through the use of sand and gravel that contains alien plant seeds; and
- Fires would put native plant species at competitive disadvantage.

The use of Helemanō Trail would introduce more invasive species to the area. This would have a minor indirect impact on sensitive species because the area where the trail is proposed is largely made up of agricultural lands and dirt roads. Construction of Helemanō Trail would draw more people to the trail. A long-term increase in the use of Helemanō Trail is associated with the Proposed Action. This includes increasing Stryker and conventional truck traffic on the proposed road. There would be an increase in the number of conventional Army trucks (trucks and HMMWVs) and Strykers used on roads to and from SBMR, WAAF, and the Helemanō Trail. There would be 161 trucks and 114 Strykers that would travel on the roads and trail, twelve times per year, with most traffic concentrated on the new trail (see Table 2-7).

The prolonged prohibition of hunting in certain areas because of unexploded ordnance has allowed populations of alien mammals, such as pigs, to expand. However, no new impact areas would be created in conjunction with the Proposed Action, and the population of feral ungulates and other alien mammals is not expected to increase. Increased troop transport among subinstallations and between islands could increase the likelihood of alien invertebrates colonizing new areas. Increased activity and disturbance could cause stress to neighboring higher habitat value areas and would assist in the establishment of nonnative species in the immediate and surrounding areas. Therefore, SBCT actions along Helemanō Trail could adversely affect the recovery of listed species in the SBMR ROI.

Fire exacerbates nonnative species spread and establishment. Hawaiian plants have not evolved to withstand fires because there is little natural cause of fire on the islands. As a result, nonnative species have a competitive advantage in surviving and propagating successfully after a fire. If native species withstand an initial fire, they are often destroyed by later fires influenced by the invasion of highly flammable grasses. The potential spread of alien species resulting from potential wildfires is considered a significant impact because alien species often out-compete native species and destroy native communities. Sensitive plant species likely to be affected by a SBCT related spread of nonnative species in the ROI are listed in Table 5-27, along with their associated threat level.

Table 5-27
Sensitive Plants Threatened by the Spread of Nonnative Species

Species Name	Percentage of Population within the ROI	Threat Level
Māhoe (<i>Alectryon macrococcus</i>)	7 to 8	Moderate to high
Hāhā (<i>Cyanea grimseana obate</i>)	6	Moderate
Hāhā (<i>Delissea subcordata</i>)	9	Moderate to high
<i>Diellia falcata</i>	1	High
Mehamehame (<i>Flueggea neowawraea</i>)	3	Moderate to high
<i>Hesperomannia arborescens</i>	94	Low to moderate
Aupaka (<i>Isodendron longifolium</i>)	2 (SBMR, SBER)	Moderate for those populations in the lowland mesic forests High in the areas where alien plants already dominate
<i>Labordia cyrtandrae</i>	78	Moderate
<i>Lepidium arbuscula</i>	7	High
<i>Phyllostegia mollis</i> and <i>P. kaalaensis</i>	3 and 29 to 33 individuals represented, respectively	Moderate for <i>P. kaalaensis</i> High for <i>P. mollis</i>
‘Ale (<i>Plantago princeps</i>)	20	Moderate
<i>Schiedea hookeri</i>	5 to 7	High
‘Olopū (<i>Viola chamissoniana</i>)	5	High

Source: Gomez 2003

Four species of wildlife are likely to be affected by the spread of nonnative species: O‘ahu ‘elepaio discussed in Impact 1, ‘iwi, *Achatinella mustelina*, and the Hawaiian hoary bat. For a comprehensive list of sensitive wildlife species with the potential to occur within the ROI see Table 5-24. These species could occur within the area affected by fire, erosion, and training activities, each of which increases the likelihood of the spread of nonnative species to those areas.

The impact of SBCT actions on the spread of nonnative species would be lessened by instituting the Army’s ongoing environmental programs. Measures identified in the Ecosystem Management Plan Report, O‘ahu Training Areas (R. M. Towill Corp. 1998) and the O‘ahu Training Areas INRMP (USARHAW and 25th ID [L] 2001a) for protection of

biological resources on SBMR would continue as part of the proposed SBCT project actions. The programs outlined in Section 2.1.5 of Chapter 2 would help minimize damage to habitat, lower the likelihood that sensitive species individuals are disturbed, and maintain or restore the population level of sensitive species, particularly federally listed threatened and endangered species. The washrack proposed at SBER would lower the chances of spreading nonnative plants, such as fountain grass, and invertebrates between training ranges.

Regulatory and Administrative Mitigation 3. The Army would use the following mitigation measures to lessen the level of impact to a less than significant level.

- USARHAW would follow HQDA guidance developed in consultation with the Invasive Species Council and compliance with Executive Order 13112, which determines federal agency duties in regard to preventing and compensating for invasive species impacts. USARHAW would agree to all feasible and prudent measures recommended by the Invasive Species Council that would be taken in conjunction with SBCT action to minimize the risk of harm. Implementing an environmental management system would further improve the identification and reduction of environmental risks inherent in mission activities.
- Section 7 consultation and other regulatory and administrative measures identified in mitigations 1, 2, and 4 would apply to this impact and would help reduce the impact to a less than significant level.

Additional Mitigation 3. Potential mitigation measures for this impact include:

- USARHAW is considering educating soldiers and other potential users of the facilities and roads in the importance of cleaning vehicles and field gear. Contractors and their employees would be educated about the need to wear clean clothes and to maintain clean vehicles when coming onto the construction site and would comply with measures to avoid introducing alien species to the project site.
- USARHAW is considering using native plants in any new landscaping or planting efforts, where practicable. When practicable, natural habitats would remain intact or adjacent areas would be restored as habitat.
- The Army is considering requiring all construction vehicles and equipment, excluding privately owned vehicles, to undergo a mandatory wash prior to entering construction sites. The construction vehicles and equipment would be left at the construction site or would be rewashed before returning to the construction site.
- USARHAW is considering inspecting and washing all military vehicles at wash rack facilities before they leave SBMR, KTA, or PTA to minimize spreading weeds, such as fountain grass, and relocating invertebrates.

Additional Mitigations 1, 2, and 4 would apply to this impact and would help reduce the impact to a less than significant level.

Impact 4: Loss and degradation of sensitive species and habitat. Vegetation within the impact area primarily consists of nonnative grass and shrub communities and is currently disturbed by training activities. Following construction of the proposed ranges, vegetation in the proposed range areas would continue to consist primarily of grasses. Impacts in these areas include trampling and disturbance from vehicles and military personnel. No native vegetation communities occur within the proposed project sites. Nevertheless, training operations could affect biological resources within the impact area and associated surface danger zones. Fifty-nine special status plant species have been identified as confirmed or potentially occurring within the SBMR ROI (Table 5-23). These species may propagate in the proposed SBMR ROI. Twenty-eight special status and rare wildlife species (determined to be heading to a decline based on population numbers or habitat loss) are either known to occur in the SBMR ROI or could occur, based on the presence of suitable habitat (see Table 5-24). These species use portions of the ROI for foraging, shelter, and nesting.

Habitat fragmentation and the removal and relocation of dirt to adjacent areas in and around the proposed projects would degrade habitat outside of the footprint of project activities. Training maneuvers, construction, and increased use of roads and training areas would result in erosion that would decrease the value of adjacent lands to flora and fauna. These factors threaten the successful propagation of native flora and could lead to increased proliferation of nonnative species in the area. Troop and other foot traffic in or adjacent to high value areas could harm rare natural communities, plants, and snails (R. M. Towill Corp. 1997b).

The sensitive plant species at risk from trampling are hāhā (*D. subcordata*), aupaka, and *Phyllostegia hirsuta* (Gomez 2003), though this risk is low.

Another source of habitat degradation is fire. The potential introduction of fire is discussed under Impact 2.

Of the SBMR ROI, including SRAA and Helemanō Trail, only SBER would be used for off-road mounted maneuver training. Approximately 440 acres of west SBER would be used for off-road mounted maneuver area, as identified in Figure 2-3. Combat weight is approximately 38,000 pounds (17,237 kilograms). Off-road training activities involving the Stryker would destroy vegetation, would disturb wildlife, including federally and state listed species, and would cause severe soil erosion.

Strykers would operate over existing roads as well as off-road areas suitable for maneuver. Stryker operations on roads within the installation would not be expected to affect biological resources.

Due to the weight of the Stryker vehicle, vegetation in areas where the Stryker is operated off-road likely would be crushed or flattened along tire paths. Stryker maneuvers would generally occur in unforested areas dominated by nonnative vegetation only. The present impacts of standard Army vehicles on the SBMR ROI is 28,420 MIMs (11,680 at SBER and 16,740 at SRP). Proposed mounted maneuver in the SBMR ROI is predicted to have 45,000 MIMs as a result of SBCT activities (19,145 MIMs at SBER, and 25,855 at SRAA). Mounted maneuvers in the SRAA would occur on dirt roads. Mounted maneuvers in SBER would

occur off-road in the western portions (Figure 2-3) and on roads throughout the rest of the installation. The proposed off-road mounted maneuver area proposed at SBER (Figure 2-5) would not threaten sensitive species and habitats because the area is already disturbed and heavily populated by nonnative species. No federally or state listed plants or wildlife would be directly affected by these actions. No BSAs occur within the off-road mounted maneuverability area.

Dismounted training includes walking in formations on roads or trails or in a dispersed fashion overland. Dismounted training on existing roads and trails would have no impact on biological resources, whereas off-road maneuvers could affect biological resources. If the Proposed Action were implemented, tactical dismounted maneuvers would occur in areas that are currently used for dismounted training. The only new areas that would be used for dismounted training are within the SRAA. Dismounted training would be mainly confined to roads or previously disturbed areas within the SRAA and would not be expected to affect biological resources.

Dismounted training would continue to occur in SBER, which is known to contain special status species (*Chamaesyce rockii*, *Cyanea acuminata*, *C. koolauensis*, *Cyrtandra subumbellata*, *Gardenia mannii*, *Hesperomannia arborescens*, *Isodendron longifolium*, *Lobelia gaudichaudii koolauensis*, *Phlegmariurus nutans*, *Phyllostegia hirsuta*, *Pteris lygatei*, *Sanicula purpurea*, *Tetraplasandra gymnocarpa*, and *Viola oahuensis*) and sensitive habitats (BSAs 1, 2, and 3). The training in this area generally includes very small teams whose goal is to leave no trace of their whereabouts. They are not expected to have any impact on the sensitive species or habitat. The following sensitive wildlife are known or are likely to occur in the ROI and are likely to be directly or indirectly affected by habitat degradation caused by the Proposed Action: O'ahu 'elepaio (see Impact 1), 'i'iwi, *Achatinella mustelina*, and the Hawaiian hoary bat. These species have been identified as at risk due to their occurrence within fire risk areas, near or within maneuver areas, firing ranges where there would be increased use, or where construction projects are proposed.

Helicopters would likely be used as part of SBCT actions in more remote areas of SBER. Helicopters in these sensitive and high habitat value areas would disturb snails and birds when hovering (R. M. Towill Corp. 1997b).

Mitigation measures identified in the ecosystem management plan report and INRMP, as described under Impact 1, would help avoid and minimize impacts to sensitive species.

Regulatory and Administrative Mitigation 4. To further avoid and minimize impacts to sensitive species and habitats, the following mitigation measures would be followed:

- In accordance with Section 404 of the Clean Water Act, the US Army Corps of Engineers Regulatory Branch must review any activities involving the discharge of dredged or fill material into waters of the US before construction to determine whether a Department of Army permit is required. If so, the Corps would determine whether a previously issued general permit authorizes the proposed action, or it would process a permit application for the proposed fill. If a Corps permit were

required, a Section 401 Water Quality Certification issued by the State of Hawai'i Department of Health, Clean Water Branch, would also be required, as well as compliance with other applicable federal laws.

- Section 7 consultation and other regulatory and administrative mitigation 1, 2, and 3 would apply to this impact and would help reduce the impact to a less than significant level; and
- Regulatory and administrative mitigation measures identified in Sections 5.8 and 5.9 of this chapter would lessen this impact on sensitive species and habitat.

Additional Mitigation 4. Potential mitigation measures for this impact include:

- USARHAW is considering using native plants in any new landscaping or planting efforts, where practicable. When practicable, natural habitats would remain intact or adjacent areas would be restored as habitat.
- USARHAW is considering fencing or flagging, where practicable, any sensitive plant communities from activities that may take place within the ROI.
- The Army is considering preserving or restoring sensitive habitat when feasible on its owned or leased lands.
- HQDA is considering investigating a new regulatory authority to work with nonprofit organizations to purchase buffer lands.
- Additional mitigation measures identified in Section 5.8, Water Resources, and Section 5.9, Geology, would lessen this impact on sensitive species and habitat.

Less than Significant Impacts

Threat to migratory birds. The presence of the FTI antennas could significantly affect migratory bird species known to occur in the SBMR ROI, especially those that migrate at night (USFWS 2000). Although the exact number of bird fatalities from tower collisions in Hawai'i is not known, birds are killed in large numbers worldwide by antenna support structures each year (USFWS 2000). This is a violation of the MBTA (16 USC 703-712), which prohibits taking or killing migratory birds. Tower size is also considered a factor, with towers taller than 200 feet (61 meters) responsible for the greatest number of bird fatalities (Manville 2000).

Migratory bird species known to occur at SBMR that could be adversely affected by the Proposed Action include the white-tailed tropicbird, black-crowned night heron, barn owl, golden plover, and northern cardinal (USARHAW and 25th ID [L] 2001a). USFWS tower guidelines (USFWS 2000), attached in Appendix I-2, would be integrated into the proposed project to ensure that MBTA species would not be significantly affected by the construction and placement of antennas in the SBCT ROI. Key avoidance measures include using no lighting or guy wires on the towers and keeping all towers below 199 feet.

UAVs would be allowed in restricted airspace over the entire training area, but activity is not anticipated to threaten night migrating birds. If night collisions with birds did occur, then

UAV operations would be halted at night until a solution could be agreed upon by USFWS and the Army.

Regulatory and Administrative Mitigation. The following Army SOPs and BMPs identified for federal agencies in EO 13186 would help minimize the overall impact of SBCT actions on migratory birds:

- In accordance with the MBTA, USARHAW would avoid polluting or altering the environment for the benefit of migratory birds and would monitor migratory birds in the proposed ROI, with particular focus on species of concern, where practicable, to ensure that migratory bird numbers do not decline because of the Proposed Action.
- USARHAW is conducting and would continue conducting yearly inventorying, monitoring, and collecting and assessing information on natural resources in training areas using, ITAM LCTA and Army ecosystem management that might be considered relevant to migratory bird conservation. Information gathered would be shared with the USFWS, the Biological Resources Division of the USGS, and other appropriate repositories, such as the Cornell Laboratory of Ornithology.

Noise and visual impacts. Training increases noise levels that could adversely affect the O‘ahu ‘elepaio or other vertebrates at SBMR. The increase in training and ammunition use would result in an increase in the associated noise output. A study at SBMR concluded that “artillery noise was judged to have a negligible effect on the behavior of ‘elepaio” (VanderWerf et al. 2000). The report does note that previous research, Delaney and Pater et al. in 1999, determined that louder and closer noises resulted in more intense responses (VanderWerf et al. 2000). Louder artillery noises or the closer proximity of ‘elepaio to artillery could result in more intensive disruption (VanderWerf et al. 2000). In addition to land-based noise, there would be additional aircraft in the training areas (C-17s, C-130s, and UAVs). Noise from these aircraft, displayed in Figure 5-17, would not substantially increase noise in the habitat and therefore is unlikely to alter wildlife behavior (VanderWerf et al. 2000). It is important to note that the research on this issue is not conclusive and further information is needed. Currently there is little documented evidence indicating that the increased noise as a result of SBCT training (see Section 5.6 Noise) would significantly disturb sensitive wildlife species. However, more information is needed to properly understand training-related noise effects on ‘elepaio and other wildlife. This issue would be addressed through the Section 7 consultation process. In addition to prudent and reasonable measures determined as part of USFWS consultation on this issue, the Army would comply with EO 13186 as described in *Threat to Migratory Birds*.

There are no visual impacts on biological resources from project activities.

Impacts on general vegetation and wildlife. Habitat within the ROI is for the most part disturbed natural and introduced landscapes. Activities limited to this area would mostly affect nonnative species adapted to stressed or nonnative environments. Construction of the proposed ranges collectively would directly affect approximately 846 acres (see Table 5-28).

Vegetation within the proposed footprints of these projects, which primarily includes nonnative grasses, shrubs, and pineapple fields, would be removed. Following construction of the proposed ranges, the Army would seed disturbed areas with native or noninvasive vegetation.

Table 5-28
Impact to Vegetation Communities Resulting from Construction
of Proposed Ranges

Project	Area of Impact (approximate acres)	Existing Vegetation Cover
QTR1	120	Primarily denuded with areas of nonnative grasses and shrubs
BAX	600	Primarily denuded with areas of nonnative grasses and shrubs
UAC	6	Primarily denuded, existing buildings, nonnative grasses and shrubs.
QTR2	120	Agricultural lands

Source: This information was developed as a part of Section 7 consultation.

Increased human presence and elevated noise levels in the ranges would displace various wildlife species, such as birds and rodents. Wildlife within the impact area and associated surface danger zones could be affected by ordnance or other munitions. The potential introduction of fire, which could affect wildlife, is discussed under Impact 3.

Off-road mounted maneuvers would occur throughout the western portion of SBER. Wildlife and vegetation found in this highly disturbed area is primarily nonnative. Ground-dwelling wildlife and vegetation would sustain adverse impacts as a result of the maneuvers.

Road-restricted mounted maneuvers would occur at the SRAA. This activity would mean a slight loss of vegetation and increased soil erosion because Strykers are bigger than farm equipment. The net conversion of the highly disturbed pineapple fields to fallow land with mounted maneuvers on the roadways would not amount to a significant loss of general wildlife or vegetation.

Nonnative wildlife and plants generally have a negative influence on the success of native plants and wildlife. For this reason, a loss to nonnative species, such as those commonly occurring in the project ROI, is not considered significant (see significance criteria Section 4.10).

Reduced Land Acquisition Alternative

Significant Impacts

Less land area would be disturbed during construction of the SBMR ranges because QTR2 would not be constructed in the SRAA. Approximately 726 acres would be disturbed as a result of range construction instead of 846 acres, a difference of 120 acres.

Significant biological resources impacts, mitigable to less than significant, associated with this alternative would be similar to biological resource impacts associated with the Proposed Action, with the following exceptions:

- Lower likelihood of training-induced fire than the Proposed Action. There remains an overall increase in fire risk compared to the No Action alternative due to the proposed increase in fire-inducing activities at the Main Post and SBER.
- Mounted maneuvers would not occur at the SRAA, which would mean a decrease of 25,855 MIMs from the Proposed Action. RLAA does include mounted maneuvers at SBER, which would amount to an increase of 2,385 MIMs, compared to ongoing No Action activities. This would amount to a significant and mitigable, to less than significant impact on biological resources in the SBMR ROI.

Mitigation described for the Proposed Action would apply to the RLA Alternative and would reduce significant impacts to the less than significant level.

Less than Significant Impacts

In general, there would be fewer impacts to biological resources as a result of implementing RLA because only approximately 100 acres would be acquired for military use, rather than 1,400 acres with the Proposed Action. Because 1,300 fewer acres would be acquired under RLA, there is less land area that could be disturbed by military activities.

Less than significant biological resource impacts would be identical to those under the Proposed Action, with the following exceptions:

- In general, potential impacts on general vegetation and wildlife from mounted and dismounted light maneuver training, identified under the Proposed Action and associated with the QTR2 and the 1,300 acres identified above, would not occur within the SRAA. As such, there would be only limited impacts on general vegetation and wildlife from construction in the SRAA; and
- Potential noise impacts to wildlife species from using QTR2 for small arms fire and from using the 1,300 acres for general mounted and dismounted maneuver training would no longer be expected. There would be short-term construction-related noise that would affect general wildlife; this would be temporary and would be limited by SOPs and BMPs. As such, this impact would remain less than significant.

No Action Alternative

No Action would result in no new impacts on biological resources, but would involve a continuation of existing impacts. An in-depth analysis of Legacy Force training impacts on SBMR biological resources can be found in the *O'ahu Training Areas INRMP* (USARHAW and 25th ID [L] 2001a) and the *Endangered Species Management Plan Report (ESMPR) for O'ahu Training Areas* (R. M. Towill Corp. 1997b). A synopsis of these impacts is given below.

Significant Impacts Mitigable to Less than Significant

Impacts from fire on sensitive species and habitat. Several Legacy Force actions would continue to be potential sources of fires at SBMR, including tracers, explosives ordnance, and vehicle traffic (R. M. Towill Corp. 1997b). The live fire at ranges near Schofield Barracks Forest Reserve pose the largest threat to sensitive species and native species. The Army is addressing fire control by island-wide fire management (R. M. Towill Corp. 1997b) to minimize impacts from fire, and it would continue the following mitigation measures:

- Reevaluate and revise SBMR's current fire control plan and program for inclusion into the O'ahu general fire management plan;
- Improve and clear vegetation from fuel breaks and access roads to decrease the likelihood of fire spread; and
- Implement protection and monitoring, as described in the ecosystem management plan, endangered management plan, and INRMP.

Impacts on federally listed species and their federally designated or proposed critical habitat. There have been and would continue to be impacts on the listed plants and wildlife. Vehicle and dismounted maneuvers along with live-fire and nonlive-fire training at SBMR and WAAF occurs primarily on disturbed portions of the ROI that are of low value to Hawai'i's listed species. However, the effects of fire, spread of nonnative species, noise pollution and visual presence of humans in or nearby designated and sensitive habitats negatively affects listed species that use or would potentially use this area.

The Army is undergoing Section 7 Consultation for the impacts on federally listed species and their designated critical habitat from routine training at SBMR. It would consult about proposed plant habitat for its designation. All reasonable and prudent measures determined during this consultation would be incorporated into the Proposed Action. Ongoing programs that would lessen the impact on listed species and their designated or proposed critical habitat include the ecosystem management plan, endangered species management plan, and INRMP (USARHAW and 25th ID[L] 2001a; R. M. Towill Corp. 1997b). These measures would help avoid effects and would compensate for impacts on listed species that would result directly and indirectly from implementing the No Action.

Impact on sensitive species resulting from the spread of nonnative species. Alien plants and animals, some of which may be invasive, have likely been and would continue to be introduced and to spread and would also continue to be introduced into natural areas at SBMR as a result of Legacy Force training. In compliance with Executive Order 13112 on invasive species, the Army would continue to undertake all feasible and prudent measures to minimize risk of harm caused by invasive species. Provisions are made for reducing these impacts in the *O'ahu Training Areas INRMP* (USARHAW and 25th ID [L] 2001a) by surveying for nonnatives, fencing out invasive mammals, increasing weed eradication, and evaluating and determining improvements for identifying threats and protection of rare vertebrates and invertebrates. Army environmental management (Section 2.2.4), including research, monitoring, and stabilization projects, would reduce these impacts to the less than significant level.

Loss and degradation of sensitive species and habitat. Training on or adjacent to natural habitats would continue to result in the loss of habitat and habitat degradation. Legacy Force use of the SBMR ROI causes soil erosion, habitat fragmentation, and trampling of flora and fauna, similar to that described for the Proposed Action. These impacts are minimized by limiting training areas, keeping inventories of species of concern with the potential to occur at SBMR, and promoting conservation by educating the military and the general public, all of which are included in ongoing Army environmental management (Section 2.2.4)

Less than Significant Impacts

Threat to migratory birds. Legacy Force activities would continue to have a less than significant impact on migratory birds. Status quo activities in the ROI may incidentally affect migratory birds but are unlikely to severely disturb birds, considering the highly disturbed nature of the present training area.

Noise and visual impacts. Noise would continue to be produced as a result of Legacy Force activities. Noise would have an adverse impact on animals in the area (due to disturbance) but would not significantly affect their behavior and would not lead to a population level decline. Studies such as the *Final Report: A Study to Determine the Effects of Noise from Military Training on the Endangered O'ahu 'Elepaio* (HINHP 1998) show that Army related noise on O'ahu has not significantly affected species, including sensitive species such as the 'elepaio. There are no visual impacts under this Alternative.

Impacts on general vegetation and wildlife. Troop and other foot traffic in or adjacent to native forests could continue to harm rare natural communities, plants, and snails (R. M. Towill Corp. 1997b). Mitigations for these impacts in the ESMPR include the implementing guidelines for use of training areas within SBMR. The goal of the training impact management would be to limit trampling and overall loss of habitat range (R. M. Towill Corp. 1997b).